Joining of C/SiC for aerospace applications

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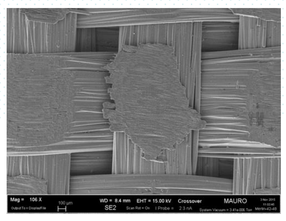
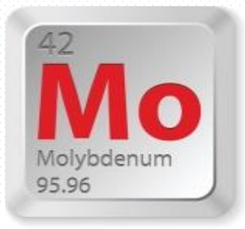
Aim: To join C/SiC to C/SiC with a new, pressure-less composite joining material and technique, for high performance applications

The Idea

Silicon viscosity is very low at its melting temperature ….. and C/SiC are porous….

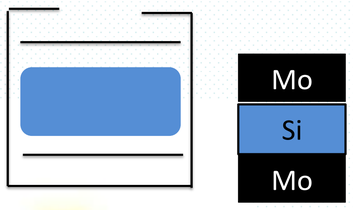


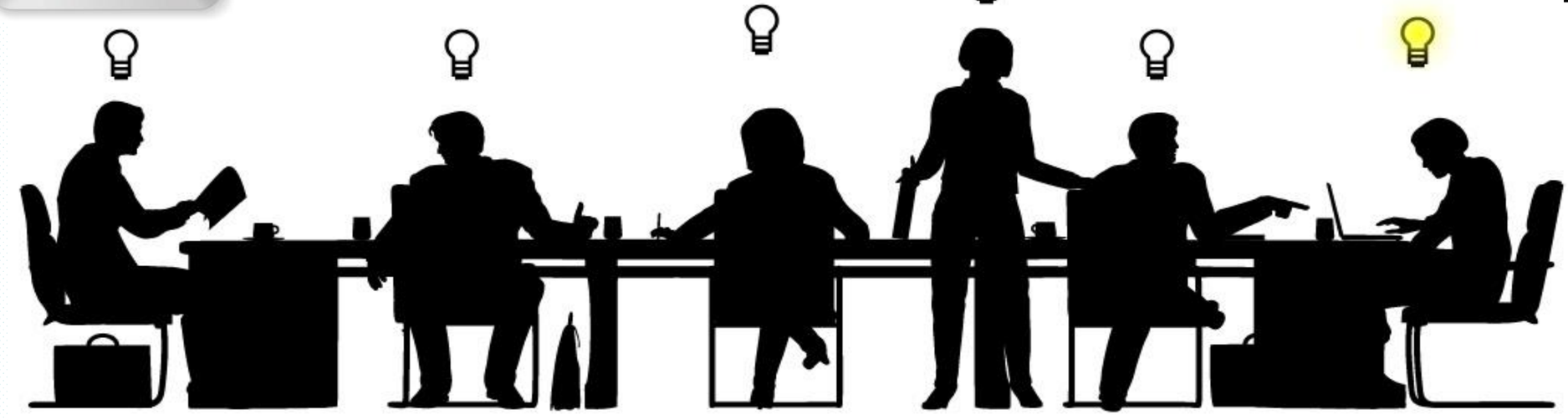
What if we add another element to reduce Si content ?



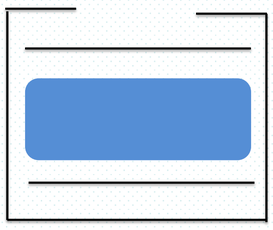
Yes! Si and Mo react to form silicides…

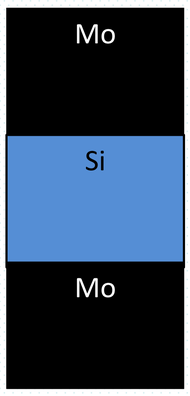
….what if we wrap Si into a Mo envelope to avoid its flowing away from the joined area ?!

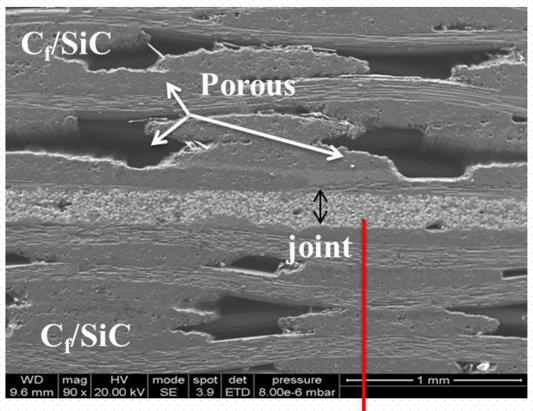




Si wrapped in a Mo envelope

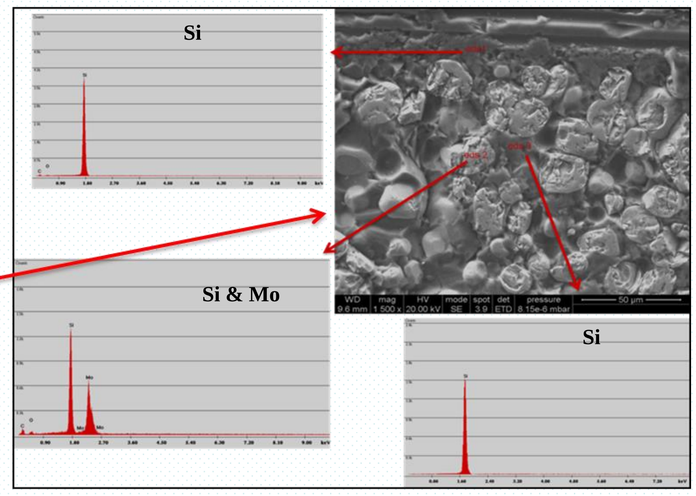


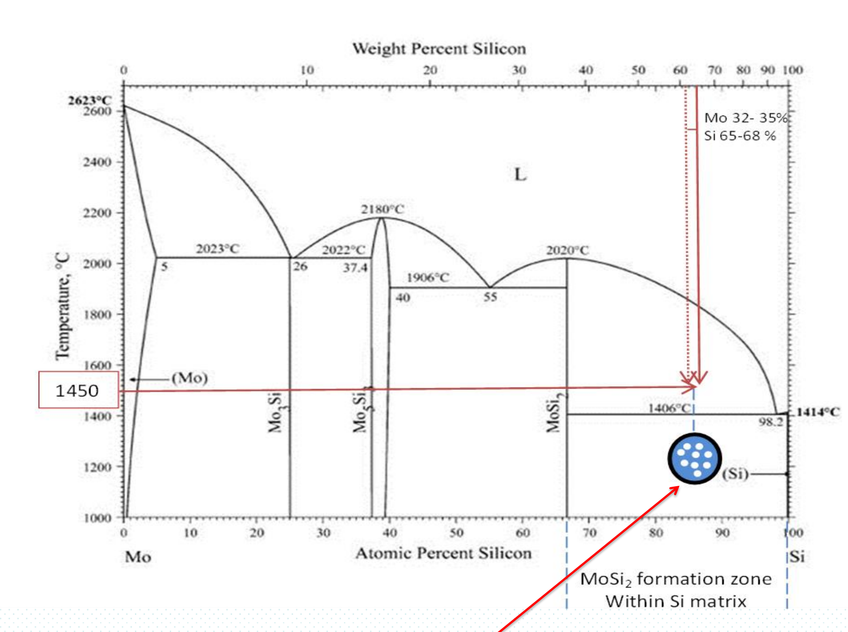




Element	Wt%	At%
Si	38.66	68.28
Mo	61.34	31.72
Total	100	100

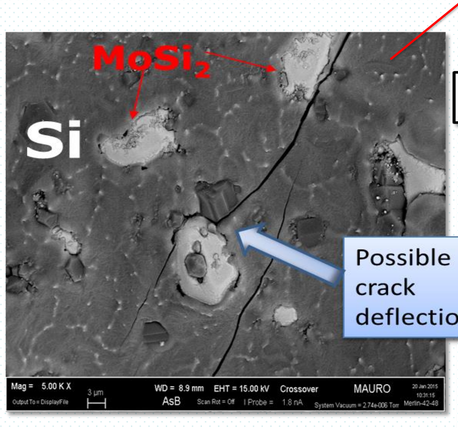
The EDS wt % confirms the formation of $MoSi_2$ which has a high melting temperature (2030°C), $MoSi_2$ is very stable and oxidation resistant at high temperature



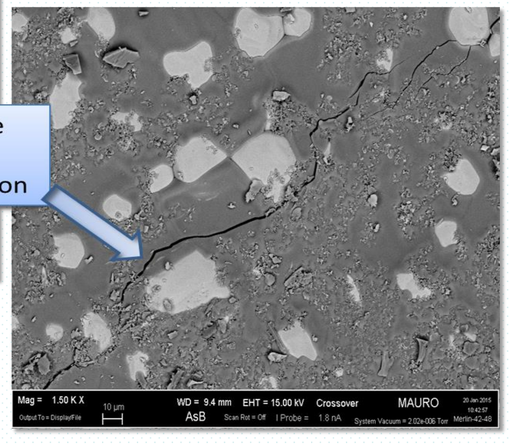


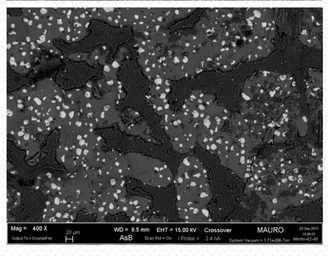
Si-MoSi2 joined C/SiC

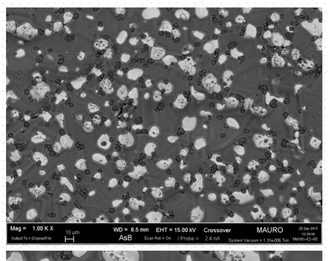
All mechanical tests gave interlaminal failure of C/SiC

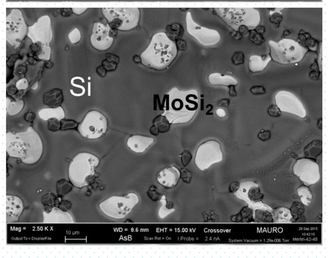


SEM fracture surface









SUMMARY

- *in situ* formation of ***$MoSi_2$*** particle reinforced **Si** matrix composite as pressure-less joining material
- silicon infiltration avoided in ***C/SiC***
- *in situ* ***$MoSi_2$***: high melting point (2020°C), oxidation resistance, Si creep behaviour at T>1000°C possibly improved, increase of fracture energy respect to pure Si joints, …
- To be tested with other materials

The research leading to these results has received funding from the European Community's 7th Framework Programme FP7 2007-2013 under the grant agreement n. 609188.